

The Gordon Wigan income for 1908 at the disposal of the special board for biology and geology has been applied as follows:—(a) 50*l.* to Mr. D. Sharp, the curator in zoology; (b) 50*l.* to Mr. A. G. Tansley, to enable the botanic garden syndicate to continue to offer special facilities for plant-breeding experiments; and (c) 50*l.* to Prof. Hughes, being 30*l.* for the purchase of a projection lantern for the geological department, and 20*l.* for the expenses of research on Pleistocene deposits in the neighbourhood. The prize of 50*l.* from the Gordon Wigan fund for an investigation in chemistry was awarded in the year 1908 to Mr. L. A. Levy, of Clare College, for his essay entitled "Investigations on the Fluorescence of Platinocyanides."

At the last meeting of the committee of Bristol University, the treasurer, Mr. George A. Wills, mentioned that he had received from Lord Winterstoke a letter intimating that he was prepared to give an additional 15,000*l.* towards the University. This, with the 20,000*l.* he had already given, makes Lord Winterstoke's contribution to the fund 35,000*l.*

A VERY interesting article on foreign associates of national societies, by Prof. E. C. Pickering, of Harvard College Observatory, which was published in the *Popular Science Monthly* in October last, has been received in excerpt form. Prof. Pickering points out that mere membership of scientific societies is, in general, a poor test of the qualifications of a man of science; but the case is very different if only foreign associates of the principal national societies or academies of the world are considered. Dealing with the physical and natural sciences alone, and assuming that foreign associates are elected wholly for eminence in a particular science, Prof. Pickering arrives at some important conclusions so far as the United States are concerned. Speaking of American representation among foreign members of the seven great scientific societies of the world, he says that in the United States the representation per million inhabitants is less than a fifth that of the principal countries of Europe. There is no American representative in mathematics or medicine, while in astronomy there are three out of ten members. Prof. Pickering explains this result by saying that while immense sums are spent on higher education in the United States, the endowment for advanced research is comparatively small. He states that astronomy is almost the only science having institutions in America devoted to research, and in which a great deal of the time and energy of men of science is not expended in teaching. Of the six American foreign associates referred to, five have occupied positions in which no teaching was required, but their entire time was supposed to be devoted to original investigation.

It has often been pointed out that the courses of instruction in schools in India have been hitherto far too literary in character, and that the whole training has not been sufficiently scientific and practical. Education in India has, in fact, suffered, as education in England suffered for a generation, because of the inability of the responsible authorities to understand that book-learning is not the knowledge that makes for progress. The supreme test of educational success is not the power to reproduce the words or works of others, but the ability to undertake an independent inquiry and to arrive at sound conclusions. The science teaching which is truly scientific makes the printed or spoken word subsidiary to the workshop or laboratory exercises, and uses adaptability rather than phonographic capacity as a measure of mental growth. As the only sound basis of scientific instruction is individual experience and activity, the extent of ground which can be studied by practical methods in a school course is necessarily limited. In our schools this is being recognised, and good science syllabuses only include subjects with which pupils may reasonably be expected to become acquainted by experiment. In several provinces of India such a desirable state of responsible opinion does not seem yet to have been reached. For instance, the *United Provinces Government Gazette*, published at Allahabad at the end of last year, contains a science syllabus for the award of high-school scholarships, and we have no hesitation in saying that it would be better not to teach science at all than to attempt to cover the extensive course pre-

scribed for the candidates. In addition to the rudimentary principles of physics and chemistry—which by themselves are more than sufficient for a school course studied by scientific methods—the syllabus includes subjects from sound, light, heat, electricity and magnetism, and chemistry of metals and non-metals. The syllabus in elementary science (physics and chemistry) for the matriculation examination of the University of Madras is of similar character—extensive instead of intensive. To prescribe such syllabuses for Indian students is to put a premium upon learning by reading rather than by doing. It may be urged that practical work is impossible in many Indian schools; but that provides no justification for instituting science courses which require a large equipment of apparatus when taught properly, instead of courses which can be studied experimentally with few special appliances. Directors of public instruction in India who desire to know how the experimental method of science can be successfully introduced into village schools should inquire into the work of the Irish Board of National Education, which has excellent schemes of work capable of being carried out without special equipment and at a minimum cost.

SOCIETIES AND ACADEMIES.

LONDON.

Zoological Society, January 12.—Prof. J. Rose Bradford, F.R.S., vice-president, in the chair.—Observations on the flagellates parasitic in the blood of fresh-water fishes: Prof. E. A. Minchin. Five species of *Trypanosoma* and four species (two new) of *Trypanoplasma*, from fishes of the Norfolk Broads, were described in detail. Particular attention was paid to the minute structure of the parasites, and it was shown that it is possible to give a uniform description for the nuclear apparatus of both *Trypanosoma* and *Trypanoplasma*.—Zoological results of the third Tanganyika expedition, 1904–5. Report on the Copepoda: Prof. G. O. Sars.—The gonadial grooves of a medusa, *Aurelia aurita*: T. Goodey. The author dealt with investigations which confirmed his earlier suggestion that the gonadial grooves, which lie in the interradial axes between the central gastric cavity and the gastric pouches, have a sexual function. From sectioned material, drawings had been obtained of spermatozoa and eggs lying within the limits of the gonadial grooves, thus proving that the latter are functional gonoducts.—The tuberculin test in monkeys, with notes on the temperature of mammals: Dr. A. E. Brown. The paper described the methods and results of experiments which have recently been carried out at the zoological gardens of Philadelphia with the view of suppressing tuberculosis in monkeys.—*Balaena glacialis* and its capture in recent years in the North Atlantic by Norwegian whalers: Prof. R. Collett.

Geological Society, January 13.—Prof. W. J. Sollas, F.R.S., president, in the chair.—Labradorite-norite with porphyritic labradorite: Prof. J. H. L. Vogt. This rock occurs off the northern coast of Norway. It contains 23 per cent. of labradorite-phenocrysts, in a crystalline groundmass of a more acid plagioclase, hypersthene, diallage, and titanomagnetite. Olivine is conspicuously absent. The plagioclase-phenocrysts are more acid in their outer zones, and the groundmass plagioclase is still more acid. From analyses the relative proportions of the constituents are calculated, and the formula of the feldspars determined. The order of crystallisation is found to be:—(1) phenocryst plagioclase; (2) plagioclase with magnetite; and (3) plagioclase, magnetite, pyroxenes. The order of crystallisation follows the physicochemical laws applying to the phase liquid-solid. Graphic representations illustrate the order of crystallisation of a ternary system of plagioclase, magnetite, and pyroxene. Equilibrium between the solid and the liquid albite-anorthite phase must have been maintained long enough for the phenocrysts to acquire a composition different from the first crystals, but eventually the equilibrium broke down. The temperature-interval of crystallisation is estimated to have been between about 1400° and 1000°. This investigation suggests that the processes of crystallisation in a magma may be explained in all details according to physicochemical laws.—The genus

Loxonema, with descriptions of new proterozoic species: Mrs. Jane **Longstaff** (née Donald). There is some confusion with regard to the type of the genus *Loxonema*. The author, following Lindström, Koken, and Perner, takes *L. sinuosum*, Sowerby, as the type. Then the other two types mentioned by Phillips cannot remain in the genus, one belonging to the genus *Macrocheilina* and the other to *Zygopleura*. The paper deals only with Ordovician and Silurian species. The diagnosis of *Loxonema* is amended, and a note given as to the range and the distribution of the genus.

Linnean Society, January 21.—Dr. D. H. Scott, F.R.S., president, in the chair.—The genus *Nototriche*, Turcz.: A. W. **Hill**. The genus *Nototriche* (Malvaceæ) includes some seventy species formerly placed in the genus *Malvastrum*, A. Gray. Two types of flower are found in the genus; in the one case the petals are almost free, and are fused with the staminal column only at the base; in the other, including the majority of the species, there is a definite tube formed by the fusion of the petals with the staminal tube. At the base of each calyx segment there is a glandular nectary. The carpels are beaked and dehiscent, and are often provided with long, silky stellate hairs. In the paper several new species are defined, and the descriptions of those already known have been amplified and re-written.—Longitudinal symmetry of *Centrosperma*: Dr. Percy **Groom**. By means of measurements of many stems—primary, secondary, tertiary, and quaternary—of one species, *Atriplex rosea*, and of other chenopodiaceous genera, namely, *Salsola* and *Chenopodium*, additional evidence is given that the internode curve of alternate-leaved *Chenopodiaceæ* is always of a zigzag nature, and can be analysed into two subcurves. Of these, one represents the displacements of the leaves from the originally opposite arrangement at the successive nodes, and the other indicates the lengths of the modern representatives of the original internodes.

Institution of Mining and Metallurgy, January 21.—Mr. Alfred James, president, in the chair.—A theory of volcanic action and ore deposits, their nature and cause: Hiram W. **Hixon**. Starting with the known fact that there is an increase of temperature of about 1° C. for each 100 feet of depth, the author claims that at about 100 miles below the surface of the earth the temperature is above the critical temperature of all known elements, from which it is assumed that all matter from the commencement of the zone of critical temperature to the centre of the earth is in a gaseous condition. The conclusion arrived at is that within that zone a part of each of the gases present is diffused throughout the zone. Secular cooling results in reducing the outer surface of the zone below the critical temperature of a part of some of the gases. As a result of secular cooling matter of high critical temperature is added to the "zone of flowage" of the solid crust, while the gases of low critical temperature would saturate the zone of flowage and segregate upward to the bottom of the "zone of fracture." There the further upward progress of the gases would be stopped until, by accumulation, they had acquired sufficient elastic force to rupture the zone of fracture. From this—the author's theory of volcanic action—is deduced his theory of ore deposition.—The Silver Islet vein, Lake Superior: Walter **McDermott**. This paper was presented, though a reprint from a technical journal published thirty-two years previously, as it bore on the subject of the foregoing paper on volcanic action and ore deposits, chiefly in connection with the occurrence of graphite and silver. It dealt with facts, however, rather than with theories.—An instance of secondary impoverishment: H. H. **Knox**. This paper, dealing with deposits on the private estates of Kishtim, in the government of Perm, Russia, had to be held over for discussion at the February meeting.

PARIS.

Academy of Sciences, January 25.—M. Bouchard in the chair.—Presentation of vols. xi. and xiii. of the *Annales de l'Observatoire de Nice*: M. **Bassot**. The first volume contains four memoirs:—the velocity of light by the toothed-wheel method, meridian observations, equatorial and meridian observations concerning the planet Eros, and the third catalogue of nebulae discovered with the large

Nice equatorial by M. Javelle. The other volume is devoted to meteorology.—Reunion of the permanent international committee of the map of the sky: B. **Baillaud**. This committee will meet at the Paris Observatory from April 19–24.—A résumé of some observations of M. A. Ricco on the earthquake in Sicily and Calabria of December 28, 1908: A. **Lacroix**. A map is given showing the epicentral zone at Messina, and seven other zones, classified according to the severity of the effects produced.—A fossil alga from the Sinemurian: P. **Fliche**. This fossil was shown to arise from a purely cellular plant, and this conclusion was derived, not only from the characters of the parenchyma constituting the plant, but also from the elliptic bodies borne on its surface. This is the first plant of its kind found in the Lias.—The tenth campaign of the *Princesse Alice II.*: **Albert I., Prince of Monaco**.—Fridtjof Nansen addressed a letter to the perpetual secretary concerning the proposed Polar expedition of Captain R. Amundsen.—The deformation of surfaces of negative curvature: E. **Goursat**.—Electrocapillary phenomena in gases at low pressures: G. **Reboul**. A capillary electrometer in which the dilute acid is replaced by a rarefied gas exhibits analogous phenomena.—An arrangement for sensibly reinforcing the sound perceived in a receiver with an electrolytic detector: M. **Jégou**.—A plate with a network of lines giving stereoscopic relief by direct vision: E. **Estanave**.—A new method of preparation of the alkyl ethers: J. B. **Senderens**. The catalytic substance employed is alumina, obtained by precipitating sodium aluminate with sulphuric acid. If this is maintained at a temperature between 240° C. and 260° C., and the vapour of ethyl alcohol passed over it, ethyl ether is continuously formed. It is not necessary for the success of this experiment that the alcohol should be absolute. Methyl ether and propyl ether have been obtained in the same way.—The condensation of the mesoxalic esters with tertiary aromatic amines: A. **Guyot** and E. **Michel**.—The regeneration of coffee plantations by the introduction of a new species: Jean **Dybowski**. Owing to the destruction of *Coffea arabica* by disease, many districts have been obliged to grow coffee. The substitution of *Coffea liberica*, a more robust plant, has not been successful, owing to the inferior quality of the coffee produced by this plant. The author now proposes the use of a new species, *Coffea congoensis*, which grows wild in the neighbourhood of Oubanghi. Its resistance to the disease of Hemileia appears to be well established; the coffee berries are of good commercial quality, and it contains about 1.2 per cent. of caffeine.—The unification of the number of segments in the larvæ of the Muscidae: J. **Pantel**.—Contribution to the study of the constitution of the proteid materials by the hydrolysing action of hydrofluoric acid. The preparation of definite natural peptides: L. **Hugonienq** and A. **Morel**. The advantages of the use of a 25 per cent. solution of hydrofluoric acid as a hydrolysing agent have been pointed out in a previous paper. It is now shown that by varying the strength of the acid employed the hydrolysis can be stopped at different stages, and several well-defined natural peptides have been isolated in this way (as the picrate).—The ammoniacal fermentation: J. **Effront**.—The value of the muscular striations in polarised light: Fred. **Viès**.—The application of d'Arsonvalisation localised to certain regions, principally in the cephalic region: A. **Moutier**. In these experiments the solenoid only surrounded the head and shoulders. In all the cases treated the results were favourable; the objective phenomena disappeared, and the arterial pressure was lowered.—The extension of the rhætic sheet in the pre-Alps of Berne and Fribourg: F. **Rabowski**.—The rhætic sheet in the Vaudois pre-Alps: Alphonse **Jeannot**.—Transportation phenomena in Anjou and Brittany: E. **Jourdy**.—The value of the magnetic elements at the Observatory of Val-Joyeux on January 1, 1909: M. **Moureaux**.—The earthquake of January 23, 1909: Alfred **Angot**. A copy of the seismographic trace from the Parc Saint-Maur Observatory is given.

NEW SOUTH WALES.

Royal Society, December 2, 1908.—Mr. W. M. Hamlet, president, in the chair.—Diagram showing the rainfall of Australia: J. **Barling**. The chart is designed

to show, at a glance, the annual rainfall of many years for all Australia, as taken from the official returns. Geraldton, Queensland, holds the record for great rains, while the least rainfall of Australia appears to be that of Lake Eyre and its vicinity. The lake, now, is mostly a dry bed, and is below sea-level. A second chart shows the daily rainfall of Sydney for the past fifty years, together with other details.—Revision of the Australian Orectolobidae: J. D. Ogilby and A. R. McCulloch. An account of the Australian members of the family, which includes the wobbegongs or carpet sharks, cat sharks, &c. Diagnoses of the genera and species are given, and a new name, *Cirrhorhinus*, is proposed for *Brachaelurus colcloughi*, Ogilby. The extraordinary egg-case of *Chiloscyllium punctatum*, M. and H., is described for the first time. Whereas in most other sharks the egg-case is attached to surrounding weeds, &c., by long tendrilliform processes at either end, that of *C. punctatum* hangs by a median loop, the parts of which are woven round the support by the lips of the parent after deposition. The paper is illustrated with plates of several of the species.—Some geological notes on the country behind Jervis Bay: Dr. H. I. Jensen. The writer shows that the country between the Upper Shoalhaven and the sea has the character of a raised marine plain subsequently dissected by faulting and erosion. The Sassafras Tableland and Currockbilly Range he considers to be a "horst" or "block mountain."—Vocabulary of the Ngarrugu tribe, New South Wales: R. H. Mathews.—The sedimentary rocks of the Lower Shoalhaven River: C. F. Laceron. In this paper it is intended primarily to show the geological sequence of the various formations in the district and the local geographical changes which took place at the close of the period, during which the Clyde Coal-measures were deposited.—The discontinuity of potential at the surface of glowing carbon: J. A. Pollock, A. B. B. Ranclaud, and E. P. Norman. In a circuit with one heated electrode in air at ordinary pressure, the projection of ions from the hot surface necessitates the establishment of a potential difference between the electrodes if the current in the circuit is to be zero. This potential difference in certain circumstances may be taken as a measure of the surface discontinuity, and values have been obtained in the case of glowing carbon at various temperatures.

DIARY OF SOCIETIES.

THURSDAY, FEBRUARY 4.

ROYAL SOCIETY, at 4.30.—On the Electricity of Rain and its Origin in Thunderstorms: Dr. George C. Simpson.—The Effect of Pressure upon Arc Spectra, No. 3, Silver. $\lambda_{4000}-\lambda_{4600}$: W. Geoffrey Duffield.—The Tension of Metallic Films deposited by Electrolysis: G. Gerald Stonev.—A Further Note on the Conversion of Diamond into Coke in High Vacuum by Cathode Rays: A. A. Campbell Swinton.
CIVIL AND MECHANICAL ENGINEERS' SOCIETY, at 8.—The Stability of Arches: Prof. Henry Adams.
LINNEAN SOCIETY, at 8.—On *Fucus spiralis*, Linn.: Dr. F. Børgesen.—Economy of *Ichneumon manifestator*, Linn.: C. Morley.—On the Polyzoa of Madeira: Rev. Canon Norman, F.R.S.
RÖNTGEN SOCIETY, at 8.15.—The Transport of Ions: Dr. Howard Pirie.

FRIDAY, FEBRUARY 5.

ROYAL INSTITUTION, at 9.—The Influence of Superstition on the Growth of Institutions: Prof. J. G. Frazer.
INSTITUTION OF CIVIL ENGINEERS, at 8.—The Design and Construction of Docks: Sir Whately Elliot.
GEOLOGISTS' ASSOCIATION, at 7.30.—Annual General Meeting.—Presidential Address: The Jubilee of the Geologists' Association: Prof. W. W. Watts, F.R.S.

MONDAY, FEBRUARY 8.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—My Recent Expedition in Tibet: Dr. Sven Hedin.

TUESDAY, FEBRUARY 9.

ROYAL INSTITUTION, at 3.—The Architectural and Sculptural Antiquities of India: Prof. A. A. Macdonell.
ROYAL ANTHROPOLOGICAL INSTITUTE, at 8.15.—Deneholes: Rev. J. W. Hayes.
FARADAY SOCIETY, at 8.—Applications of Electrolytic Chlorine to Sewage Purification and Deodorisation by the "Oxychlorides" Process: Dr. S. Rideal.—A New Electrical Hardening Furnace: E. Sabersky.
INSTITUTION OF CIVIL ENGINEERS, at 8.—Further Discussion: On Heat-flow and Temperature-distribution in the Gas-engine: Prof. B. Hopkinson.
COLD STORAGE AND ICE ASSOCIATION (Royal Society of Arts), at 7.30.—Some Scientific Problems in the Preservation of Food by Artificial Refrigeration: C. T. Taber.

WEDNESDAY, FEBRUARY 10.

GEOLOGICAL SOCIETY, at 8.—Geological Features observable at the Carpathia China-Clay Pit, Cornwall: J. H. Collins.—Recent Observations on the Brighton Cliff-formation: E. A. Martin.
ROYAL SOCIETY OF ARTS, at 8.—Bosnia and Herzegovina: A. R. Colquhoun.

THURSDAY, FEBRUARY 11.

ROYAL SOCIETY, at 4.30.—*Probable Papers*: The Nerves of the Atrio-ventricular Bundle: J. Gordon Wilson.—An Experimental Estimation of the Theory of Ancestral Contributions in Heredity: A. D. Darbishire.—On the Determination of a Coefficient by which the Rate of Diffusion of Stain and other Substances into Living Cells can be measured, and by which Bacteria and other Cells may be Differentiated: H. C. Ross.—The Origin and Destiny of Cholesterol in the Animal Organism. Part III., The Absorption of Cholesterol from the Food and its Appearance in the Blood: C. Dorée and J. A. Gardner.—On the Origin and Destiny of Cholesterol in the Animal Organism. Part IV., The Cholesterol Contents of Eggs and Chicks: G. W. Ellis and J. A. Gardner.
INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Use of Large Gas Engines for Generating Power: L. Andrews and R. Porter.
MATHEMATICAL SOCIETY, at 5.30.—On the Relation between Pfaff's Problem and the Calculus of Variations: Prof. A. C. Dixon.—On Implicit Functions and their Differentials: Dr. W. H. Young.—On a Certain Family of Cubic Surfaces: W. H. Salmon.—Some Fundamental Properties of Lebesgue Integrals in a Two-dimensional Domain: Dr. E. W. Hobson.—Modular Invariants of a General System of Linear Forms: Prof. L. E. Dickson.

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